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### PLANTAE MEXICANAE II

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THE IDENTIFICATION OF TEONANACATL,  
A NARCOTIC BASIDIOMYCETE OF THE AZTECS

#### I. Introduction

Investigations dealing with the vegetable narcotics, intoxicants, and poisons used by primitive peoples comprise studies which involve some of the most fundamental culture-traits. The narcotic plants of the New World especially are attracting popular attention while stimulating scientific interest. In this connection, a large ethnobotanical and ethnopharmacological literature is being developed. A recent anthropological study (13) has briefly summarized some of the information concerning the primitive uses of a number of narcotics and has emphasized the importance to theoretical anthropology of correctly identified and thoroughly investigated ethnobotanical material. Indeed, this summary and other recent papers have clearly emphasized the need, as well as the desirability, of further botanical and ethnological investigations of plant narcotics, their uses, and their significance.

The plant narcotics of Mexico are of unique interest because careful records of their uses at the time of the Spanish Conquest are often available. It is possible, therefore, to compare their past uses with the uses made of

them at the present time. Fundamental to any study of this kind, however, is a thorough botanical investigation of plant uses among modern Mexican Indians and a critical examination of the earlier ethnobotanical records.

Botanical and anthropological literature contains many references to a mushroom which has been employed as a narcotic by some of the Indians of Mexico. The Aztecs and the Chichimecas were the earliest recorded users of these mushrooms which they called *teonanacatl*. For several centuries, however, the identity of *teonanacatl* has remained obscure. Recurring references to it have mystified biological and anthropological investigators, inasmuch as careful search had failed to reveal any Mexican fungus possessing properties used to induce a narcosis. It has been suggested that the reports which associate *teonanacatl* with a mushroom are misleading or erroneous, although the sources from which they come are in other respects dependable and credible.

Both from a botanical and ethnological point of view a knowledge of the identity of *teonanacatl* should prove of value. Furthermore, the correct identification of this narcotic plant is rendered desirable and necessary because an obvious misidentification has gained wide acceptance among botanists and anthropologists.

## II. The identification of *teonanacatl*

In the summer of 1938, I began ethnobotanical investigations among the Mazatec Indians of northeastern Oaxaca and learned that a mushroom, subsequently identified as *Paneolus campanulatus* L. var. *sphinctrinus* (Fr.) Bresadola<sup>1</sup>, was being used as a narcotic.

<sup>1</sup>I wish to express my thanks to Dr. David Linder of the Farlow Herbarium, Harvard University, who corroborated field identifications and rendered further taxonomic assistance.



In 1937, Dr. Blas Pablo Reko, my co-collector in Oaxaca, sent me several pieces of a mushroom which he found used as a narcotic by the Otomi Indians of Puebla and adjacent regions. Unfortunately, these specimens were poorly preserved, but they are referable to the genus *Paneolus* and belong to a related if not to the same species as those which were collected in Oaxaca.

Johnson (9) reports that three kinds of mushrooms are used by Mazatec *brujos* (witch-doctors); the names of these he reports as *steyí* and *tsami-yé*, *tsamikíshu*, and *tsamikindí*. Although botanical identifications were not made, it is probable that these are all species of *Paneolus*, possibly *P. campanulatus* var. *sphinctrinus* and its close allies *P. campanulatus* L. and *P. papilionaceus* Fr.

When identifiable specimens of the fungus had been secured and when ample information regarding its use was obtained, it became evident that *Paneolus campanulatus* var. *sphinctrinus* was the *teonanacatl* of the ancient Aztecs.

***Paneolus campanulatus* Linnaeus var. *sphinctrinus* (Fries) Bresadola** Iconographia Mycologica (1931) t. 894.

*Agaricus (Paneolus) sphinctrinus* Fries Epicrisis systematis mycologici seu synopsis Hymenomycetum (1836-1838) 235-236.

Bresadola's description is:

“Pileus carnosulus, parabolicus, obtuse acuminatus, opacus, levis, udus, glaber, fuligineo-nigricans, sicco olivaceo-lividus vel fuliginosus, subsericeus,  $1\frac{1}{2}$ – $2\frac{1}{2}$  cm. altus latusque, velo albo primitus dentato-appendiculatus; lamellae subconfertae, postice adnatae, cinereo-nigricantes, atro-maculatae, acie concolores; stipes fistulosus, cylindraceo-filiformis, aequalis, fuligineo-griseus, apice albo-

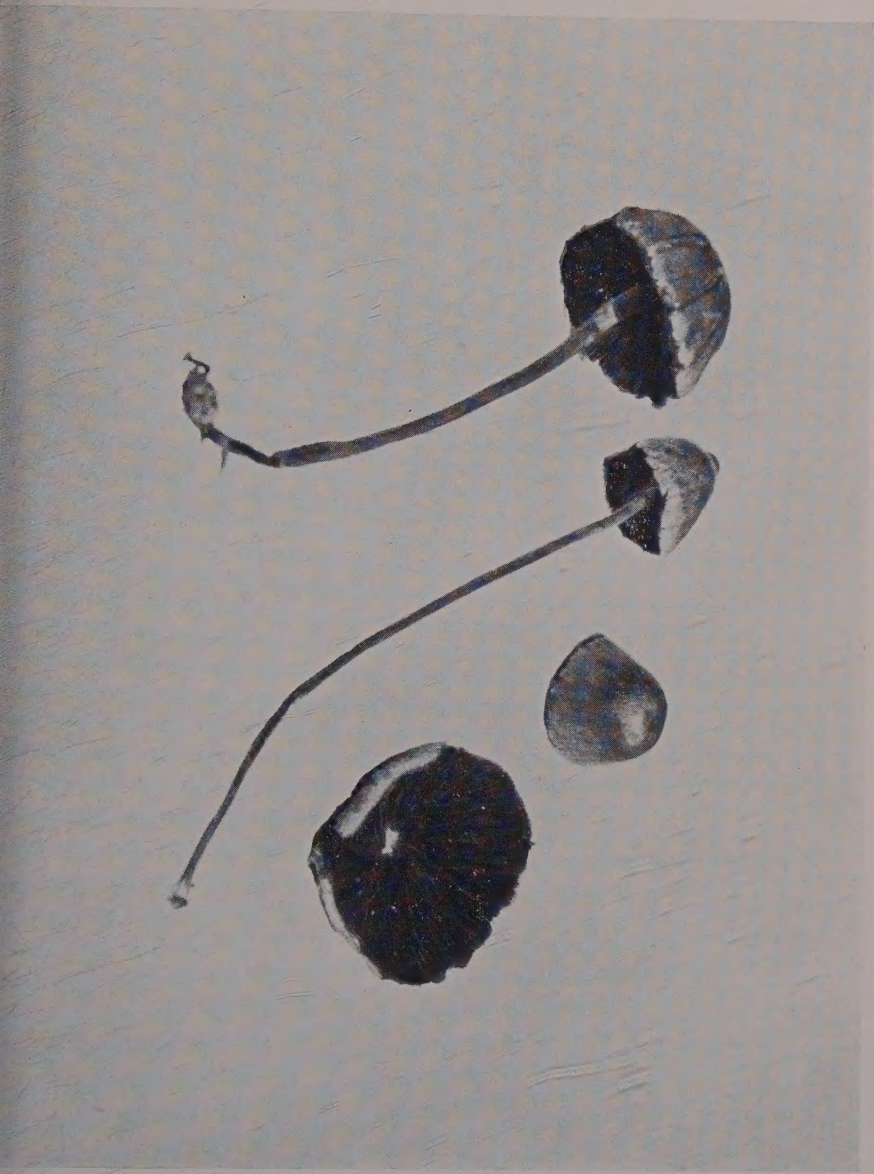
pruinosis, deorsum rufescens, basi albo-floccosus, 5–8 cm. longus,  $1\frac{1}{2}$ – $2\frac{1}{2}$  mm. crassus; caro tenuis, dilute umbrina, inodora et insapora; sporae sublimoniformes, fusco-atrae, opacae, leves, 14–18–9–12 $\mu$ ; basidia clavato-capitata, 25–30–12–14 $\mu$ ; cellulae aciei lamellarum cylindratae, 50–60–6–7 $\mu$ .”

MEXICO: in boggy spots in meadows during heavy rains, Huautla de Jiménez, Oaxaca, July 27, 1938, *Richard Evans Schultes & Blas Pablo Reko 231*, Harvard Botanical Museum Collections (Economic Botany) No. 5548.

COMMON NAMES: Aztec—*nanacatl* (“mushroom”), *teonanacatl* (“sacred mushroom”), *quauhtlanacatl* (“wild mushroom”); Mazatec—*t-ha-na-sā* (meaning unknown), *she-to* (“pasture mushroom”), *to-shka* (“intoxicating mushroom”); Otomi—unknown.

The Oaxacan specimens, upon which this identification of *teonanacatl* is based, agree closely with the variety of *Paneolus campanulatus* L. which was made by the reduction of *Agaricus* (*Paneolus*) *sphinctrinus* Fr. to varietal rank. They lack, however, the pronounced appendiculate margin which is figured by Bresadola (3). The mushrooms are small, never more than ten centimeters in height. The dark brown stipe is terete and very slender and measures from one to two millimeters in diameter; the dark color of the stipe serves to separate this species from the closely related *Paneolus papilionaceus* Fr. The pileus, three centimeters in diameter and one half centimeter in height, is usually somewhat conical (perfectly hemispherical in a few specimens), slightly cuspidate, and of a light yellowish-brown color. The gills are spotted and are dark brownish-black. The spores, varying from  $12\text{--}15 \times 7.5\text{--}8.3 \mu$ , are black. This mushroom and its close relatives *Paneolus campanulatus* L. and *P. papilionaceus* Fr. are exceedingly widespread, occurring on all the major continents.





PANEOLUS CAMPANULATUS *L.*  
*var. SPHINCTRINUS (Fr.) Bresadola*



Among the Mazatec Indians, *Paneolus campanulatus* var. *sphinctrinus* is regularly used by some members of the tribe as a narcotic. The plant does not appear to be common in the Mazatec country. It grows in pastures and open fields during the rainy season from June to September. Those who use it search for it eagerly, gathering and drying it for future use. Because the mushroom is regarded as being semi-sacred, it is difficult to purchase specimens. They are usually presented as a gift.

There are among the Mazatecs professional diviners who earn a livelihood by endeavoring through mushroom intoxication to locate stolen property, discover secrets, and give advice. The narcotic is taken to induce a semi-conscious state accompanied by a mild delirium. The incoherent utterances made during intoxication are interpreted as prophetic or admonitory. This, curiously enough, parallels the use of *ololiuqui* (the seeds of *Rivea corymbosa* (L.) Hall.f.), a convolvulaceous narcotic which is still used in parts of Oaxaca, and of various species of *Datura* which are very widely employed to induce a delirium that is thought to assist in divination and witchcraft.

The professional Mazatec diviners evidently store large numbers of these mushrooms for use throughout the year, for the doses said to be required for intoxication are large. It was impossible to learn whether these diviners practice their art exclusively with *Paneolus* or whether they are general *curanderos* (herb-doctors) as well. They are said to age rapidly, probably because of frequent ingestion of the slightly poisonous *Paneolus*; at the age of thirty-five, senility is apparent.

It was impossible to ascertain the extent of this profession, but the use of the narcotic is by no means confined to the diviners. Any individual may eat the mushrooms. That the consumption of the fungus is large



is borne out by the fact that it was with difficulty that we were able to secure two dozen specimens. Johnson (9) has learned that certain "narcotic mushrooms" are of importance in Mazatec witchcraft, and it is probable that these also are referable to the genus *Paneolus*.

The doses which the Indians employ vary with the size and age of the individual. Usually fifteen mushrooms are sufficient to induce the desired effect, but larger doses are reported. Overdoses of fifty or sixty mushrooms result in poisoning, while continued use of excessive quantities is said to produce permanent insanity. Whether or not this is true could not be ascertained.

According to Indian descriptions, the intoxication lasts about three hours. Shortly after ingestion of the mushrooms, a general feeling of exhilaration and well-being is experienced. This state of exhilaration is followed within an hour by hilarity, incoherent talking, and later, is accompanied by fantastic visions in brilliant colors, similar to the visions so characteristic of peyote-intoxication (*Lophophora Williamsii* (Lem.) Coulter).

*Paneolus* is known to be slightly poisonous and narcotic. With the exception of Mexican Indians, I am aware of no primitive peoples who take advantage of the properties of this genus for intoxication. The effects of *Paneolus* have been studied (5,6,12) and the symptoms of the intoxication are similar to those of alcoholic-intoxication. Ford (6) has divided mushroom-poisoning into five categories: the choleriform type (*Amanita phalloides* (Fr.) Quél.); the nerve-affecting type in which occur convulsions and coma often resulting in death, (*Amanita muscaria* (L.) Pers. and other muscarine-containing forms); the gastro-intestinal type which is seldom fatal; the blood-dissolving type; and the cerebral type. *Paneolus*-intoxication belongs to the last category of poisonings. It is characterized by exhilaration, fantastic visual



hallucinations, a feeling of ease and well-being, muscular incoördination, drowsiness, a staggering gait or difficulty in walking, emotional excesses, laughter, incoherent and uncontrolled speech, and mydriasis. The effects following ingestion are always of short duration.

It is of significance that the description of *Paneolus*-intoxication by Douglas (5) and Krieger (12) is practically identical with that given by the Mazatec Indians and with descriptions found in early Spanish accounts of the use of *teonanacatl* among the Aztecs.

### III. Historical background of *teonanacatl*

The first attempt to identify *teonanacatl* botanically was made in 1915, when Safford (18,19) published his conclusions that the so-called "mushroom" was, in reality, a part of the cactus *Lophophora Williamsii* (Lem.) Coulter and, notwithstanding the numerous independent reports and descriptions in literature, was not a fungus.

After a careful study of herbarium specimens, Safford failed to find a Mexican mushroom with narcotic or intoxicating properties. Safford (19) states: "Three centuries of investigation have failed to reveal an endemic fungus used as an intoxicant in Mexico, nor is such a fungus mentioned either in works on mycology or pharmacography; yet the belief prevails even now that there is a narcotic Mexican fungus...". This induced him to search among other plants and plant products for something which the early writers or the Indians might have confused with a dried fungus. He believed that the dried, brown, discoidal head (mescal button) of the spineless peyote-cactus (*Lophophora Williamsii*) resembled "a dried mushroom so remarkably that, at first glance, it will even deceive a mycologist" (19). Peyote was used by the Aztecs as a religious narcotic during this same period, and the symptoms of intoxication were described as some-

what similar, especially in the production of fantastic visual hallucinations. It should be emphasized, however, that there is actually little similarity in appearance between mescal buttons and the dried pilei of *Basidiomycetes*: the shrivelled crowns of *Lophophora Williamsii* assume the drab color of a dried mushroom, it is true, but a heavy cushion of closely placed areolate tufts of silky hairs densely clothes the upper surface of the dried cactus-head, while the fibrovascular region is clearly visible on the lower surface. It seems improbable, therefore, that either the historians or the Indians were deceived by a superficial color-resemblance.

However, Safford (18,19) based his conclusions: 1) on the apparent absence from Mexico of narcotic or intoxicating mushrooms and 2) on the supposed similarity between mescal buttons and dried mushrooms. He concluded that the Aztec Indians, who gathered for use both *peyote* and *teonanacatl* and whose botanical knowledge and powers of observation were keen, had failed to recognize the hard, wrinkled, brown mescal buttons as a part of the soft, succulent, green peyote-plant of the desert. The former, he assumed, they called *teonanacatl*, the latter *peiotl*.

Furthermore, Safford had at his command a number of the detailed descriptions of the early writers on Mexico. He failed to see in these, however, any overwhelming negation of his identification of *teonanacatl*. As LaBarre (14) aptly states: "Safford identifies the two by a somewhat casual use of his evidence and mystifies himself with the consistent contradiction offered by all the early Spanish writers to his assumption. He composes the contradiction by assuming that the Aztecs did not recognize the dried, discoidal button as the same plant as the green cactus; despite overwhelming etymological evidence, he



supposes they called the former 'teonanacatl' and the latter 'peyotl' ''.

Much of the work done by Safford in the identification of important and interesting economic plants of ancient Mexico was brilliant. It is not surprising, therefore, that workers were inclined to accept his treatment of teonanacatl. Safford's erroneous identification unfortunately was generally accepted and has become rather firmly established in both botanical and anthropological literature.

Until recently, no published objections were raised against Safford's identification. From the first, however, Doctor Blas P. Reko maintained that peyote and teonanacatl were not identical. Reko has carried out rather extensive botanical collecting and anthropological investigations of several kinds in Mexico for more than a quarter of a century. From his own experience and from a belief in the dependability of the early reports, he insisted on the presence of a narcotic mushroom among Mexican Indians. Thus, in 1919, he stated (15) that nanacatl was "div. géneros de hongos, especialmente un hongo negro que crece sobre estiércol y produce efectos narcóticos," and in 1923, he wrote as follows in a letter<sup>2</sup>: ". . . I see in your description of *Lophophora* that Dr. Safford believes this plant to be the 'teonanacatl' of Sahagun which is surely wrong. It is actually, as Sahagun states, a fungus which grows on dung-heaps and which is still used under the same old name by the Indians of the Sierra Jaurez in Oaxaca in their religious feasts . . .".

<sup>2</sup>Letter: B.P.Reko, Guadalajara, Mexico, to J.N.Rose, United States National Museum, Washington, D. C., July 18, 1923; herbarium sheet No. 1745713, United States National Herbarium, Washington, D.C.

The first published objection to Safford's identification appeared in 1936 (17): "Dem [the Safford identification] muss widersprochen werden. Die Nanacates sind Giftpilze, die mit Peyote nichts zu tun haben. Seit alten Zeiten ist es bekannt, dass ihr Genuss Rauschzustände, Extasen, und Geistesstörungen hervorruft, aber trotz ihrer Gefährlichkeit hat man sie überall, wo sie vorkommen, wegen ihrer berauschenden Eigenschaften bis auf den heutigen Tag geschätzt". V. A. Reko (17) suggests, but without corroboration or evidence, that nanacatl might be a species of *Amanita*. This refutation of Safford's identification, however, is important inasmuch as it once more centered attention on the problem. In 1937 and in 1938, I (23, 24) summarized the evidence against the identity of peyote and teonanacatl, and in 1938, La Barre (13) also indicated his doubts of Safford's identification.

Fray Bernardino de Sahagun (c. 1499-1590) was the first European to record the use of teonanacatl as a narcotic. There are several distinct references to this plant in his *Historia de las cosas de Nueva España* (20). One of these references, in a general consideration of useful plants, states that:

... they [the Chichimecas] possessed a great knowledge of plants and roots, and they were acquainted with properties and virtues of them; these same people were the first to discover and use the root which they called *peiotl*, and those who are accustomed to eat and drink them used them in place of wine; and they did the same with those which they call *nanacatl*, which are harmful mushrooms which intoxicate in the same way as wine ...

A more detailed report of nanacatl is to be found in a chapter devoted to the consideration of narcotic and intoxicating plants:

There are some small mushrooms in that region which are called *teonanacatl*; these grow under the grass (hay) of the fields and pas-



tures. They are round, having a rather high stipe, slender and terete. When eaten, they have a bad taste, hurting the throat, and they cause intoxication. They are medicinal for fevers and for rheumatism. Only two or three need to be eaten. Those who eat them see visions and feel a faintness of the heart. And they provoke to lust those who eat a number, or even a few, of them.

In the first of these excerpts, Sahagun clearly distinguished between "the root which they call *peiotl*" and "*nanacatl*, which are harmful mushrooms." Likewise in his chapter on narcotic plants from which the second excerpt is taken, Sahagun discussed the "small mushrooms . . . which are called *teonanacatl*" and in another paragraph recognized *peiotl* as a distinct plant:

There is another herb like the earth-tunas which is called *peiotl*. It is white and grows in the north. Those who eat it see terrifying and amusing visions. The intoxication persists for two or three days and then stops. . .

In a third reference to the mushrooms, Sahagun explained the intoxication in great detail:

The first thing which they ate at the gathering was small, black mushrooms which they called *nanacatl*. These are intoxicating and cause visions to be seen and even provoke sensuousness. They ate these [mushrooms] before dawn, and they also drank chocolate before daylight. They ate these little mushrooms with honey, and when they began to be excited by them, they began to dance, some singing, others weeping, for they were already intoxicated by the mushrooms. Some did not want to sing but sat down in their quarters and remained there as if in a meditative mood. Some saw themselves dying in a vision and wept; others saw themselves being eaten by a wild beast; others imagined that they were capturing prisoners in battle, that they were rich, that they possessed many slaves, that they had committed adultery and were to have their heads crushed for the offense, that they were guilty of a theft for which they were to be killed, and many other visions which they saw. When the intoxication from the little mushrooms had passed, they talked over among themselves the visions which they had seen.

From Sahagun's three references, it is obvious that the root-word *nanacatl* meant "mushroom." *Teonana-*

*catl* probably was the correct word for the narcotic species, and *nanacatl* served as a more general term. This more general use is found in still another one of Sahagun's botanical references to mushrooms:

The cone-shaped mushrooms (*nanacatl*) *genus campos agrorum* in the mountains are good to eat. They are cooked for this purpose; if they are eaten raw or poorly cooked, they produce vomiting or diarrhea, and they may kill.

Further evidence of the meaning of *nanacatl* is found in the various combinations which were made by adding prefixes denoting the color, habitat, or attributes of the plant. Hernandez (8) describes the narcotic mushroom under the heading: "De *nanacatl* seu *Fungorum* genere." He considered *teonanacatl* as *teyhuinti* or "intoxicating", distinguishing from it several other types of mushrooms: *ixtacnanacame* (white mushrooms), *tlapalnanacame* (reddish mushrooms), and *chimalnanacame* (yellow-orbicular mushrooms).

Jourdanet and Siméon (21) define *teonanacatl* as follows: "(*Teonanacatl*) c'est à dire: champignon dangereux. La terme générique est *nanacatl*, qui se met en composition avec d'autres mots pour désigner les diverses espèces de champignons."

Siméon (26) analyzes several words with *nanacatl* as a root and clearly points out the meaning of the term:

"*Nanacatl* Champignon; *quauhlla-nanacatl*, champignon des bois; au fig. *nanacatl nicté-ittitinemi* (Olm.), rendre quelqu'un pervers, lui donner de mauvais conseils. En comp.: *nonanac* ou *nonanacauh* (Olm.), mon champignon. R. *nacatl*?

"*Nacatl* Chair, viande; . . . *nonac*, ma viande, la chair que je mange.

"*Teonanacatl* Espèce de petit champignon qui a mauvais goût, enivre, et cause des hallucinations; il est médicinal contre les fièvres et la goutte (Sah.) RR. *teotl*, *nanacatl*.

"*Teyhuinti* Qui enivre quelqu'un, enivrant; *teyhuinti nanacatl*, champignon enivrant."



An additional piece of evidence may be found in the use of the word *nanacatl* in modern Mexico. In provision markets of Mexico, mushrooms in general are called *nacatl* (17).

Serna (25) recorded a very complete description of *teonanacatl* and its use as a narcotic and clearly distinguished it from peyote:

And it so happened that an Indian had come . . . bringing some of the colored mushrooms which are gathered in the hills, and, with these, he had performed a great idolatry. But before explaining this [idolatry], I wish to explain the nature of the said mushrooms which, in the Mexican language, are called *quatlannamacatl* . . . these mushrooms were small and yellowish, and to collect them the priests and old men, appointed as ministers for these impostures, went to the hills and remained almost the whole night in sermonizing and in superstitious praying. At dawn, when a certain little breeze which they know began to blow, they would gather them [the mushrooms], attributing to them deity. They have the same effects as *ololiuqui* and peyote, for when they are eaten or drunk, they intoxicate, depriving those who partake of them of their senses and making them believe a thousand absurdities.

Benvento in Kingsborough (10) reports the use of mushrooms for intoxication:

They had another kind of intoxication . . . which was induced by small toadstools or mushrooms . . . which are eaten raw. Because of the bitter taste of these mushrooms, they drink after them or eat with them a little honey after which they shortly see a thousand visions, especially snakes. They went raving mad, and they ran about the streets wildly . . . In their language they called these mushrooms *teunamacatlth*, a word which means "bread of the gods . . .".

Basing his statement on the etymology proposed by Siméon (21, 25), LaBarre (14) points out that Benvento's etymology is wrong. The belief that *teonanacatl* means "bread of the gods" or "flesh of the gods" is widespread. Thus, in an unpublished manuscript, V. A. Reko (16) applies the meaning of "divine food of a soft or fleshy nature" to *teonanacatl*. Safford (18, 19) consist-

ently used the expression "flesh of the gods." Bancroft (1), in speaking of the intoxicants of the Nahuatls, wrote: "Among the ingredients used to make their drinks more intoxicating, the most powerful was the *teonanacatl*, 'flesh of the gods', a kind of mushroom which excited the passions and caused the partaker to see snakes and divers other visions."

There are numerous less explicit references to the use of mushrooms for intoxication in Mexico. These have no common names or descriptions which might serve to identify the plant, but it is probable that some of the references concern the same species of *Paneolus* which has been identified as *teonanacatl*. One of these references (11) relates that visitors who had come to the coronation of Montezuma were offered "wild mushrooms" to eat; these intoxicated them and made them dance. Duran, quoted by Bourke (2) states that after the sacrifice of human beings at the coronation of Montezuma II, the multitude ate raw mushrooms and that these induced an intoxication which was much stronger than alcoholic-intoxication; many committed suicide during the height of the intoxication; some received visions and were, in this way, permitted to foresee the future. It is probably safe to assume that the plants spoken of in these two instances were the *teonanacatl*, *Paneolus campanulatus* var. *sphinctrinus* or a related species. The great similarity in the intoxication to that which Ford (6) has described for *Paneolus* would seem to suggest that the intoxicant was a member of this genus.

Thompson (27) reports Saville as stating that Tizoc, an Aztec ruler who was poisoned after a five year reign, may have been killed by the substitution of poisonous mushrooms for the intoxicating kind which were normally eaten at ceremonies. It is probable that, if this were the case, the deadly *Amanita phalloides* (Fr.) Qué. was



the instrument of death. Since this extremely poisonous mushroom could never be overlooked and mistaken for a species of *Paneolus*, it argues that the mushrooms must have been utilized dry, in which condition substitution would have been less difficult.

The discovery of the use of *Paneolus campanulatus* var. *sphinctrinus* as a narcotic among the Mazatecs of Oaxaca and its identification as the teonanacatl of ancient Mexico greatly enhances our knowledge of the useful Basidiomycetes. While the genus *Paneolus* has been known to have poisonous and narcotic properties, its use for intoxication has not been reported, so far as I have been able to learn, for any primitive peoples outside of Mexico. *Amanita muscaria* (L.) Pers., the fly-agaric, has been used somewhat ritually as a narcotic intoxicant by the natives of Kamchatka, and this has received rather intensive botanical, chemical, medical, and ethnological study for many years. *Amanita muscaria*, like *Paneolus campanulatus* var. *sphinctrinus*, is widely spread, but its use as a definite narcotic is confined to the relatively small Kamchatka area of northeastern Siberia, as the use of *Paneolus campanulatus* var. *sphinctrinus* as a narcotic is apparently known only from Mexico. Dorman in Bourke (2) reports that mushrooms were worshipped in the Antilles, in Virginia, and in California. Such a practice might be interpreted as indicating possibly a former use of the plant as a narcotic to produce oracular delirium. Possibly, however, the reverence accorded to the mushrooms is due to other entirely unrelated causes.

#### IV. Summary

1). *Paneolus campanulatus* L. var. *sphinctrinus* (Fr.) Bresadola is used as a narcotic in daily life and in divination and witchcraft among the Mazatec Indians of northeastern Oaxaca.

2). A species of *Paneolus* is employed as a narcotic by the Otomi Indians of Puebla and adjacent regions.

3). The size, color, form, growth habits, uses, and narcotic effects of *Paneolus campanulatus* var. *sphinctrinus* correspond so closely to the descriptions of the same aspects of the hitherto unknown *teonanacatl* of the early Mexican writers that there can be little doubt that this species represents the intoxicating mushroom which was in very wide use in daily life, in ceremonies, and in divination and witchcraft among the Aztecs and Chichimecas at the time of the Spanish Conquest.

4.) The discovery of the use of *Paneolus campanulatus* var. *sphinctrinus* as a narcotic and the identification of this fungus with *teonanacatl* should dispel the confusion which has resulted in literature from Safford's misidentification of *teonanacatl* with peyote.

5). References in the early literature indicate that the Aztecs possessed an extensive knowledge of the useful and harmful Basidiomycetes.

6). Although species of *Paneolus* are found all over the world and are known to possess intoxicating or slightly poisonous properties, no reference to their use as narcotics is known for primitive peoples outside of Mexico.



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